

REMARKS

Attached hereto is a marked-up version of the changes made to the claims by the current amendment, captioned "Version with markings to show changes made."

Claims 8-15 are objected to as containing nominal method steps. Method claim 8 recites steps (a) and (b), which respectively form first and second magnetic layers of a magnetic layer having a multi-layer structure, so that a Cr-content of the first magnetic layer is larger than that of the second magnetic layer which is formed on the first magnetic layer, and a sum total content of non-magnetic elements which are other than Cr and which non-magnetic elements have a larger atomic ratio than Co in the first magnetic layer is larger compared to that of the second magnetic layer. Thus, while applicants disagree with the examiner's comment, applicants appreciate the absence of a restriction requirement.

The specification is objected to as failing to provide proper antecedent basis for claims 5 and 12. Claims 5 and 12 have been amended to avoid this objection, in line with the description on page 20, lines 5-12 of the specification, for example.

Claims 1-5, 7, 8, 10, 12 and 14 stand rejected under § 112(2), as being indefinite. Claims 1-5, 7, 8, 10, 12 and 14 have been amended to overcome this formal rejection. Withdrawal is requested.

Claims 1-3, 7-10, 15 and 16 stand rejected under § 103(a) as being unpatentable over Parkin in view of Paik et al., further in view of Tani et al. Applicants traverse this rejection for the following reasons.

First, Parkin fails to teach a magnetic layer having a multi-layer structure in which a second magnetic layer is provided on a first magnetic layer. In Parkin, it is essential to provide a spacer layer between two adjacent magnetic layers. In other words, no magnetic layer is provided directly on another magnetic layer within the multi-layer structure. In addition, Parkin fails to teach the relationships of the “Cr-content” and the “sum total content of non-magnetic elements which are other than Cr and which non-magnetic elements have a larger atomic radius than Co” for the first and second magnetic layers.

Second, both Paik et al. and Tani et al. fail to teach a magnetic recording medium having a multi-layer structure in which a second magnetic layer is provided on a first magnetic layer. Further, both Paik et al. and Tani et al. fail to teach the relationships of the “Cr-content” and the “sum total content of non-magnetic elements which are other than Cr and which non-magnetic elements have a larger atomic radius than Co” for the first and second magnetic layers of such a multi-layer structure.

The absence of these features is strong evidence of non-obviousness. Accordingly, it is believed that claims 1-3, 7-10, 15 and 16 are allowable over Parkin, Paik et al. and Tani et al.

Claims 4, 5, 11 and 12 stand rejected under § 103(a) as being unpatentable over Parkin in view of Paik et al., further in view of Tani et al. and further in view of Malhotra et al. and Bian et al.

Claims 4, 5, 11 and 12 are dependent upon base claims 1 and 8 which are allowable over Parkin, Paik et al. and Tani et al. as discussed above. Both Malhotra et al. and Bian et al. also fail to teach the subject matter of the base claims 1 and 8 from which claims 4, 5, 11 and 12 depend. Accordingly, it is believed that claims 4, 5, 11 and 12 are allowable over Parkin, Paik et al., Tani et al., Malhotra et al. and Bian et al.

Claims 6 and 13 stand rejected under § 103(a) as being unpatentable over Parkin in view of Paik et al., Tani et al., Malhotra et al. and Bian et al., and further in view of Bertero et al.

Claims 6 and 13 are dependent upon base claims 1 and 8, which are allowable over Parkin, Paik et al. and Tani et al., as discussed above. Malhotra et al., Bian et al. and Bertero et al. all fail to teach the subject matter of the base claims 1 and 8, from which claims 6 and 13 depend. Accordingly, it is believed that claims 6 and 13 are allowable over Parkin, Paik et al., Tani et al., Malhotra et al., Bian et al. and Bertero et al.

New claims 17 and 18 have been added for consideration. The new claims are supported by the original disclosure on page 20, lines 5-15 of the specification, for example. It is believed that the new claims 17 and 18 are also allowable over the prior art of record.

For the foregoing reasons, applicants believe that this case is in condition for allowance, which is respectfully requested. The examiner should call applicants' attorney if an interview would expedite prosecution.

Respectfully submitted,

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VERSION WITH MARKINGS TO SHOW CHANGES MADE**In the Claims:**

Claims 1-5, 7, 8, 10, 12 and 14 were amended, and new claims 17 and 18 were added as follows.

1. (Amended) A magnetic recording medium comprising:

a substrate; and

a magnetic layer ~~made of~~, comprising a CoCr-based alloy and non-magnetic elements other than Cr, and having a multi-layer structure and disposed above said substrate,

said multi-layer structure having a first magnetic layer disposed above said substrate and at least one second magnetic layer disposed on said first magnetic layer on an opposite side from said substrate,

said first magnetic layer having a Cr-content larger than that of said second magnetic layer, and

said first magnetic layer having a larger sum total content of nonmagnetic elements which are other than Cr and which non-magnetic elements have a larger atomic radius than Co than compared to said second magnetic layer.

2. (Amended) The magnetic recording medium as claimed in claim 1, wherein said first and second magnetic layers include at least one nonmagnetic element selected from a group consisting of Pt, Ta, W and B.

3. (Amended) The magnetic recording medium as claimed in claim 1, wherein said first and second magnetic layers include approximately 8 to 15 at% of Pt, and approximately 1 to 6 at% of B.

4. (Amended) The magnetic recording medium as claimed in claim 1, further comprising:

a first underlayer ~~made of~~ comprising a Cr-based alloy and disposed on said substrate; and

a second underlayer ~~made of~~ comprising a Cr-based alloy and disposed between said first underlayer and said first magnetic layer,

said second underlayer having a larger sum total content of elements other than Cr than said first underlayer.

5. (Amended) The magnetic recording medium as claimed in claim 4, wherein ~~said first and second underlayers include~~ second underlayer includes at least one element selected from a group consisting of Mo, Ti, W, V and Ta.

7. (Amended) The magnetic recording medium as claimed in claim 1 comprising a plurality of second magnetic layers, wherein:

 said first magnetic layer has a Cr-content larger than that of a lowermost one of said second magnetic layers disposed closest to said first magnetic layer, and

said first magnetic layer has a larger sum total content of nonmagnetic elements which are other than Cr and which non-magnetic elements have a larger atomic radius than Co ~~than~~ compared to the lowermost one of said second magnetic layers; and

 between two mutually adjacent second magnetic layers, the Cr-content and the sum total content of the nonmagnetic elements are respectively larger for a second magnetic layer disposed closer to said first magnetic layer.

8. (Amended) A method of producing a magnetic recording medium which includes a magnetic layer ~~made of~~ comprising a CoCr-based alloy and non-magnetic elements other than Cr and having a multi-layer structure, comprising the steps of:

 (a) forming a first magnetic layer on a base layer; and
 (b) forming at least one second magnetic layer on the first magnetic layer,

 said steps (a) and (b) being carried out so that a Cr-content of the first magnetic layer is larger than that of the second magnetic layer, and a sum total content of

nonmagnetic elements which are other than Cr and which non-magnetic elements have a larger atomic radius than Co in the first magnetic layer is larger than compared to that of the second magnetic layer.

10. (Amended) The method of producing the magnetic recording medium as claimed in claim 8, wherein said steps (a) and (b) form the first and second magnetic layers to include approximately 8 to 15 at% of PrPt, and approximately 1 to 6 at% of B.

12. (Amended) The method of producing the magnetic recording medium as claimed in claim 11, wherein said steps (c) and (d) form the first and second underlayers step (d) forms the second underlayer to include at least one element selected from a group consisting of Mo, Ti, W, V and Ta.

14. (Amended) The method of producing the magnetic recording medium as claimed in claim 11, wherein said step (c) forms the first underlayer on the substrate at a substrate bias voltage of approximately 0 to -150 V, and said step (d) forms the second underlayer on the substrate via the first underlayer at a substrate bias voltage of approximately -100 to -300 V.

17. (New) The magnetic recording medium as claimed in claim 5, wherein a sum total of elements other than Cr is larger for the second underlayer than the first underlayer.

18. (New) The method of producing the magnetic recording medium as claimed in claim 12, wherein said steps (c) and (d) form the first and second underlayers so that a sum total of elements other than Cr is larger for the second underlayer than the first underlayer.